

**WHAT IS CLAIMED**

Sub 937 1. A device, comprising:  
a package;  
a semiconductor device having at least one optical receiver and/or transmitter adjacent a surface of said semiconductor device facing away from said package; and  
a thin film overlay electrically connecting bond pads on said semiconductor device to electrically conductive pads on a layer of said thin film overlay facing away from said semiconductor device.

2. The device of Claim 1, including an electrically conductive medium on said electrically conductive pads for connecting said device directly to external hardware.

Sub 947 3. The device of Claim 2, in which said package includes a cavity that matches or exceeds the dimensions of the semiconductor device.

4. The device of Claim 3, wherein said package includes at least one heat slug.

5. The device of Claim 1, wherein said thin film overlay includes a hole between said optical receiver and/or transmitter on said semiconductor device and said layer of said thin film overlay facing away from said semiconductor device.

Sub B3 6. The device of Claim 5, wherein said hole is back filled with an optical quality material.

7. The device of Claim 2, including a device attach adhesive in the cavity.

8. The device of Claim 1, wherein said thin film overlay includes at least one layer of dielectric material and at least one layer of conductive material.

9. The device of Claim 8, wherein a layer of thin film overly adjacent said semiconductor device is a layer of dielectric material.

10. The device of Claim 9, wherein said layer of conductive material is patterned into a first layer of respective conductors.

11. The device of Claim 10, wherein some of said respective conductors are pads and some are planes.

12. The device of Claim 11, including vias filled with electrically conductive material from bond pads of said semiconductor device through said layer of dielectric material and to said respective conductors.

13. The device of Claim 12, including a second layer of dielectric material adjacent said first layer of respective conductors and a second layer of conductive material patterned into a second layer of respective conductors.

14. The device of Claim 13, including vias filled with electrically conductive material from conductors of said first layer of respective conductors, through said second layer of said dielectric material, and to conductors of said second layer of respective conductors.

15. The device of Claim 14, wherein said additional conductor of said second layer of respective conductors are patterned into an array of pads.

16. The device of Claim 12, including at least one additional alternating pair of layers of dielectric material and conductive material patterned into a layer of respective conductors, with each additional layer of dielectric layer being adjacent the previous layer of respective conductors.

17. The device of Claim 16, including vias filled with electrically conductive material from conductors of a previous layer of respective conductors, through an adjacent layer of dielectric material and to conductors of another layer of respective conductors.

18. The device of Claim 17, including solder balls attached to the last layer of respective conductors.

19. The device of Claim 17, including metal bumps attached to the last layer of respective conductors.

20. The device of Claim 17, including polymer connectors attached to the last layer of respective conductors.

21. The device of Claim 8, including at least a second dielectric layer between said dielectric layer and said layer of conductive material.

22. The device of Claim 16, including at least an additional dielectric layer between each dielectric layer and the next layer of conductive material.

23. The device of Claim 1, including at least one additional semiconductor device within said package.

24. The device of Claim 23, wherein said thin film overlay connects bond pads on said semiconductor devices to electrically conductive pads on a layer of said thin film overlay facing away from said semiconductor device.

25. The device of Claim 24, wherein said thin film overlay connects some of the bond pads of said semiconductor devices to each other and other of the bond pads to electrically conductive pads on a layer of said thin film overlay facing away from said semiconductor devices.

26. A method, comprising:

placing a semiconductor device in a package, said semiconductor device having at least one optical receiver and/or transmitter adjacent a surface of said semiconductor device facing away from said package; and

forming a thin film overlay on a surface of said semiconductor device for connecting bond pads on said semiconductor device to electrically conductive pads on a layer of said thin film overlay facing away from said semiconductor device.

27. The method of Claim 26, including, placing at least one additional semiconductor device in said package.

28. The method of Claim 27, wherein said forming said thin film overlay includes connecting bond pads on said at least one additional semiconductor device to electrically conductive pads on said layer of said thin film overlay facing away from said semiconductor device.

29. The method of Claim 27, wherein said forming said thin film overlay includes connecting some of the bond pads of said semiconductor devices to each other and other of the bond pads to electrically conductive pads on a layer of said thin film overlay facing away from said semiconductor devices.

30. The method of Claim 26, wherein said semiconductor device is placed in a cavity, within the package, that matches the dimensions of the semiconductor device.

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31. The method of Claim 30, including depositing a layer of device attach adhesive into said cavity before said semiconductor device is placed in said cavity.

32. The method of Claim 26, wherein said forming said thin film overlay includes applying a layer of dielectric material over the semiconductor device and the entire adjacent package surface, forming a conductive layer above and adjacent said dielectric layer and patterning said conductive layer into a layer of respective conductors.

33. The method of Claim 32, including forming vias filled with electrically conductive material, from conductors of said first layer of respective conductors, through said second layer of said dielectric material, and to conductors of said second layer of respective conductors.

34. The method of Claim 32, including forming at least one additional alternating pair of layers of dielectric material and conductive material patterned into a layer of respective conductors, with each additional layer of dielectric layer being adjacent the previous layer of respective conductors.

35. The method of Claim 34, including forming vias filled with electrically conductive material from conductors of a previous layer of respective conductors, through an adjacent layer of dielectric material and to conductors of another layer of respective conductors.

36. The method of Claim 35, including forming solder balls on the last layer of respective conductors.

37. The method of Claim 35, including forming metal bumps on the last layer of respective conductors.

38. The method of Claim 35, including forming polymer connectors on the last layer

of respective conductors.

39. The method of Claim 32, including forming at least a second dielectric layer between said dielectric layer and said layer of conductive material.

40. The method of Claim 34, including forming at least an additional dielectric layer between each dielectric layer and the next layer of conductive material.

41. The method of Claim 26, wherein said electrically conductive pads on a layer of said thin film overlay facing away from said semiconductor device are patterned into a ball grid array.

42. The method of Claim 25, including forming a hole between said optical receiver and/or transmitter on said semiconductor device and said layer of said thin film overlay facing away from said semiconductor device.

43. The method of Claim 42, including back filling said hole with an optical quality material.

43. The method of Claim 36, wherein said solder balls are used as an alignment mechanism for aligning an external optical signal to said device's optical receiver and/or transmitter.

44. A method, comprising:

placing a semiconductor device in a package, said semiconductor device having at least one optical receiver and/or transmitter adjacent a surface of said semiconductor device facing away from said package;

connecting bond pads on said semiconductor device to electrically conductive pads on a surface of said semiconductor device facing away from said semiconductor device;

forming solder balls on said electrically conductive pads; and